

AMENDMENTS

In the Specification

[0081] **Figures 4A-D** depicts TEM images of THPC alloy seed-gold nano-shell nano-particles;

[0090] **Figures 13 A-DA&B** depict FE-SEM images of silica core-silver nano-rod nano-particles: (A) Silver nanorod 71-5, and (B) Silver nanorod 71-6, (C) Silver nanorod and (D) Silver nanorod;

[0092] **Figures 15A-D** depict FE-SEM images of discrete hydrogel-coated gold particles: (A&B) discrete hydrogel-coated gold nano-particles (120 nm core), and (C&D) discrete hydrogel-coated gold nano-particles(100 nm core);

[0132] **Figures 55A-B** depicts FE-SEM images of 10-15 nm silver nano-particles coated with a gold nano-shell where 1 mL of gold nano-particle solution was used in the preparation;

[0134] **Figures 57A-B** depicts FE-SEM images of 10-15 nm silver nano-particles coated with a gold nano-shell where 3 mL of gold nano-particle solution were used in the preparation;

[0358] Referring now to **Figures 13A-DA&B**, FE-SEM images of silica core-silver nano-rod nano-particles are shown from to different silica core solution concentrations, while **Figures 14A-B** depict TEM images of silica core-silver nano-rod nano-particles from two other preparations.

[0367] Referring now to **Figures 17A-DA-B**, FE-SEM images of discrete hydrogel-coated gold nano-particles are shown. In **Figures 17A&B**, discrete hydrogel-coated gold nano-particles having a 120 nm core diameter are shown, while in **Figure 17C&D** discrete hydrogel-coated gold nano-shell nano-particles having a 100 nm core diameter are shown. Referring now to **Figure 18A-CB**, TEM images of discrete hydrogel-coated gold particles are shown. In **Figures 18A&C** discrete hydrogel-coated gold nano-particles having a 120 nm core diameter are shown, while in **Figure 18B** discrete hydrogel-coated gold nano-particles a 100 nm core diameter are shown. Referring now to **Figure 19**, a schematic of a preferred discrete hydrogel coating process is shown where a gold nano-particles is first seeded with polymers nodes and then the hydrogel is grown from the nodes. Referring now to **Figures 20A-B**, absorbance spectra of hydrogel-coated gold nano-particles in neutral (**Figure 20A**) and acidic or basic media (**Figure 20B**) are shown. Referring now to **Figures 21A-D**, FE-SEM images of ~60 nm bare gold nano-particles (**Figure 21A**), ~100 nm hydrogel-coated gold nano-particles (**Figure 21B**), ~130 nm hydrogel-coated gold nano-particles (**Figure 21C**), and ~230 hydrogel-coated gold nm nano-particles (**Figure 21D**). Referring now to **Figure 22**, an EDX spectrum of hydrogel-coated gold nano-particles is shown clearly evidencing the gold lines.

Referring now to **Figure 23A**, a plot of particle size verse pH for bare gold nano-particles and hydrogel-coated gold nano-particles is shown, where the gold nano-particles do not undergo a change in size; while the hydrogel-coated gold nano-particles undergo an increase in size between pH 2 and 4. Referring now to **Figure 23B**, a plot of particle size verses temperature for bare gold nano-particles and hydrogel-coated gold nano-particles is shown, where the gold nano-particles do not undergo a change in size; while the hydrogel-coated gold nano-particles undergo a decrease in size starting at about 30°C. Referring now to **Figure 24**, a plot of hydrodynamic diameter (nm) verses temperature, where the temperature is cycled between about 25°C and about 40°C due to periodic irradiation of light within the plasmon resonance spectral band.

[0388] Referring now to **Figures 26A&B**, SEM images of 50-60 nm gold nano-particles. **Figures 27A&B** show FE-SEM images of 50-60 nm gold nano-particles coated with a gold nano-shell where 7 mL of gold nano-particle solution were used in the above preparation. **Figures 28A&B** show FE-SEM images of 50-60 nm gold nano-particles coated with a gold nano-shell where 3 mL of gold nano-particle solution were used in the above preparation. **Figures 29** shows UV-vis spectra of 50-60 nm gold nano-particles with nano-shells prepared with 1 mL, 3 mL, 5 mL, and 7 mL of the 50-60 nm gold nano-particle solution according to the above preparation. **Figures 30A&B** show FE-SEM images of 50-60 nm gold nano-particles. **Figures 31A&B** show FE-SEM images of 50-60 nm gold nano-particles coated with a gold nano-shell where 3 mL of gold nano-particle solution and a low concentration of reducing agent were used in the above preparation. **Figures 32A-C** show FE-SEM images of 50-60 nm gold nano-particles coated with a gold nano-shell where 5 mL of gold nano-particle solution and a low concentration of reducing agent were used in the above preparation. **Figures 33A&B** show FE-SEM images of 50-60 nm gold nano-particles coated with a gold nano-shell where 7 mL of gold nano-particle solution and a low concentration of reducing agent were used in the above preparation. **Figure 34** shows UV-vis spectra of 50-60 nm gold nano-particles with nano-shells prepared with 3 mL, 5 mL, and 7 mL of the 50-60 nm gold nano-particle solution in the above preparation. **Figures 35A&B** show FE-SEM images of 10-15 nm gold nano-particles. **Figures 36A-C** show FE-SEM images of 10-15 nm gold nano-particles coated with a gold nano-shell where 1 mL of gold nano-particle solution were used in the above preparation. **Figures 37A&B** show FE-SEM images of 10-15 nm gold nano-particles coated with a gold nano-shell where 3 mL of gold nano-particle solution were used in the above preparation. **Figures 38A-C** show FE-

SEM images of 10-15 nm gold nano-particles coated with a gold nano-shell where 5 mL of gold nano-particles were used in the above preparation. **Figures 39A&B** show FE-SEM images of 10-15 nm gold nano-particles coated with a gold nano-shell where 9 mL of gold nano-particle solution were used in the above preparation. **Figures 40A&B** show FE-SEM images of 10-15 nm gold nano-particles coated with a gold nano-shell where 2 mL of gold nano-particle solution were used in the above preparation. **Figures 41A&B** show FE-SEM images of 10-15 nm gold nano-particles coated with a gold nano-shell where 6 mL of gold nano-particle solution were used in the above preparation. **Figures 42A&B** show FE-SEM images of 10-15 nm gold nano-particles coated with a gold nano-shell where 11 mL of gold nano-particle solution were used in the above preparation. **Figure 43** shows UV-vis spectra of 10-15 nm gold nano-particles and nano-shells nano-particles prepared with 1 mL, 2 mL, 3 mL, 5 mL, 6 mL, 7 mL, 9 mL and 11 mL of the 10-15 nm gold nano-particle solution in the above preparation. **Figures 44A&B** show FE-SEM images of 50-60 nm silver nano-particles. **Figure 45** shows an FE-SEM images of 50-60 nm silver nano-particles coated with a gold nano-shell where 1 mL of silver nano-particle solution were used in the above preparation. **Figure 46** shows an FE-SEM images of 50-60 nm silver nano-particles coated with a gold nano-shell where 3 mL of silver nano-particle solution were used in the above preparation. **Figure 47** shows an FE-SEM images of 50-60 nm silver nano-particles coated with a gold nano-shell where 7 mL of silver nano-particle solution were used in the above preparation. **Figure 48** shows UV-vis spectra of 50-60 nm silver nano-particles and nano-shells nano-particles prepared with 1 mL, 3 mL, 5 mL, and 7 mL of the 50-60 nm silver nano-particle solution in the above preparation. **Figures 49A-C** show FE-SEM images of 50-60 nm silver nano-particles coated with a gold nano-shell where 1 mL of silver nano-particle solution and a low concentration of reducing agent were used in the above preparation. **Figures 50A&B** show FE-SEM images of 50-60 nm silver nano-particles coated with a gold nano-shell where 3 mL of silver nano-particle solution and a low concentration of reducing agent were used in the above preparation. **Figures 51A-D** show FE-SEM images of 50-60 nm silver nano-particles coated with a gold nano-shell where 5 mL of silver nano-particle solution and a low concentration of reducing agent were used in the above preparation. **Figures 52A&B** show FE-SEM images of 50-60 nm silver nano-particles coated with a gold nano-shell where 7 mL of silver nano-particle solution were used in the above preparation. **Figure 53** shows UV-vis spectra of 50-60 nm nano-shells nano-particles prepared with 1 mL, 3 mL, 5 mL, and 7 mL of the 50-60 nm silver nano-particle solution in the above preparation. **Figures 54A&B** show FE-SEM images of 10-15 nm

silver nano-particles. **Figures 55A-B** show FE-SEM images of 10-15 nm silver nano-particles coated with a gold nano-shell where 1 mL of gold nano-particle solution were used in the above preparation. **Figures 56A&B** show FE-SEM images of 10-15 nm silver nano-particles coated with a gold nano-shell where 2 mL of gold nano-particle solution were used in the above preparation. **Figures 57A-B** show FE-SEM images of 10-15 nm silver nano-particles coated with a gold nano-shell where 3 mL of gold nano-particle solution were used in the preparation. **Figure 58** shows an FE-SEM image of 10-15 nm silver nano-particles coated with a gold nano-shell where 4 mL of the gold nano-particle solution were used in the above preparation. **Figure 59** shows UV-vis spectra of 10-15 nm nano-shells nano-particles prepared with 1 mL, 2 mL, 3 mL, 4 mL, and 8 mL of the 10-15 nm silver nano-particle solution in the above preparation.